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The antioxidant system in the anhydrobiotic midge as an essential, adaptive mechanism for desiccation survival

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Abstract

 One of the major damaging factors for living organisms experiencing water insufficiency is oxidative stress. Loss of water causes a dramatic increase in the production of reactive oxygen species (ROS). Thus, the ability for some organisms to survive almost complete desiccation (called anhydrobiosis) is tightly related to the ability to overcome extraordinary oxidative stress. The most complex anhydrobiotic organism known is the larva of the chironomid Polypedilum vanderplanki. Its antioxidant system shows remarkable features, such as an expansion of antioxidant genes, their overexpression, as well as the absence or low expression of enzymes required for the synthesis of ascorbate and glutathione and their antioxidant function. In this chapter, we summarize existing data about the antioxidant system of this insect, which is able to cope with substantial oxidative damage, even in an intracellular environment that is severely disturbed due to water loss.

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Keywords

Anhydrobiosis, Antioxidant, Glutathione peroxidase, P. Vanderplanki, Superoxide dismutase, Thioredoxin

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